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A new species of *Ceratophysella* from Peru (Collembola: Hypogastruridae)

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A new species of *Ceratophysella* from Peru (Collembola: Hypogastruridae). - *Ceratophysella tupamara* sp. nov. from Iquitos, Peru is described and illustrated. It is easy to distinguish from *Ceratophysella denticulata* (Bagnall, 1941), the only species of the genus previously cited from Peru, by its trilobed apical bulb of antennal segment IV, the number of unguicular teeth and the body chaetotaxy.

Keywords: Iquitos - taxonomy - morphology - chaetotaxy.

INTRODUCTION

The genus *Ceratophysella* is distributed worldwide, and represented by more than 130 species (Bellinger *et al.*, 2011) mainly in the Holarctic Region. From South America only three taxa are known: *C. denticulata* (Bagnall, 1941), *C. armata* (Nicolet, 1841) and *C. communis* (Folsom, 1897). Collembola samples from the Museum of Natural History of Geneva were provided to us for study. In that important collection there are several genera from many localities in South America (Palacios-Vargas *et al.*, 2011). Among them we found some specimens of *Ceratophysella* from Peru that belong to a new species which is described in here.

MATERIAL AND METHODS

The description of the new species is based on material from the collection of the Muséum d'histoire naturelle de Genève (Palacios-Vargas *et al.*, 2011). The specimens were first cleared in 10% KOH, then in lactophenol, and mounted on microscopic slides in Hoyer's solution. Drawings were done with a Carl Zeiss contrast microscope, using a drawing tube.

The type material is deposited in the Muséum d'histoire naturelle de Genève (MHNG), and at the senior author's institution, Facultad de Ciencias, Universidad Nacional Autónoma de México (UNAM).

The terminology follows mainly Fjellberg (1998). Abbreviations are: Abd. = abdominal segment; Ant. = antennal segment; ar = anterior row; bm = basimedial; bl = basilateral; plb = proximal basilateral; mr = middle row; Oc. = ocular setae; Th. = thoracic segment; ss = sensilla; PAO = postantenal organ; pr = posterior row; px = proximal.

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RESULTS

Ceratophysella Börner, 1932

TYPE SPECIES: *Podura armata* Nicolet, 1841

DIAGNOSIS: Well pigmented Hypogastruridae of medium size. Setae differentiated in smooth microsetae or barbulate macrosetae. Seta m2 on Th. II usually absent. Chaetotaxy of type "A" or "B". Anal spines strong and on anal papillae. 8+8 eyes present. PAO with 4 lobes, the anterior lobes larger, about twice the size of one ommatidium. Ant. IV usually with simple apical bulb and 4-8 dorsal sensilla, ventrally with or without sensory file. Between Ant. III and IV often an eversible sac present. The tenent hairs almost always acuminate. Ungues with inner tooth and up to two lateral teeth on each side. Empodial appendix with broad basal lamella and terminal filament reaching half the inner edge of ungues. Ventral tube with 4+4 setae. Retinaculum with 4 + 4 teeth. Furcula well developed, dens with 6-7 posterior setae. Mucro spoon-shaped, with a high triangular flap on outer lamella.

Ceratophysella tupamara sp. nov. Figs 1-7

HOLOTYPE: MNHG, without registration number; 1 ♀ Peru, Department of Loreto, Iquitos, Río Yanayacú; sample of soil between the bark of a tree and the trunk; 18-X-1980; sample PE-80/8; leg. C. Vaucher.

PARATYPES: MNHG, without registration number 1 juvenile; same locality and date as holotype.- UNAM, without registration number; 1 ♂, 1 juvenile; same locality and date as holotype.

DESCRIPTION: Maximum body length: up to 1.5 mm. Body granules fine and uniform, dorsal of Abd. V with 10-14 granules between p1 setae. Color: dark blue. Tergite setae of different lengths, some barbulate macrosetae (50-90 µm), others smooth microsetae (22-50 µm), besides the sensorial setae (42-50 µm) (Fig. 1).

Head: Dorsal cephalic chaetotaxy (after Yosii, 1960), see Fig. 1. Differentiation between microsetae and macrosetae clear. Eyes 8+8. Eye patch with 3 setae, Oc_2 longer than Oc_1 and Oc_3, the last two subequal (Fig. 1). Antennae as long as head. Ant. I with 7 setae. Ant. II with 13 setae. Ant. III organ with 2 short rods in a small integumentary fold and 2 guard setae of similar size; eversible antennal sac between Ant. III and Ant. IV present. Ant. IV with trilobed subapical bulb and 7 short, weakly differentiated sensilla (Fig. 2), one microsensillum and one subapical organ. Ventral file organ with about 10 setae. Postantennal organ composed of 4 lobes, about two times as large as the nearest eye, with accessory tubercle (Fig. 1). Labrum with 4 distinct round papillae on distal edge; labral setal formula 4/5, 5, 4. Ventral cephalic chaetotaxy (after Fjellberg, 1998) with 5 setae in px, 4 in bm, 5 in bl, and 3 in plb. Maxilla tullberg-type. Outer maxillary lobe with 2 sublobal setae.

Dorsal thoracic chaetotaxy as in Fig. 1, Th. I with 3+3 dorsal setae in mr (m2 absent) and one lateral. Th. II with 3 rows of setae, m_2 absent, m_6 and p_4 developed as sensorial setae. Th. III with 3 rows of setae: 6+6 setae in ar, 4+4 setae in mr, m_2 present, m_6 developed as sensorial setae; 6+6 setae in pr, p_4 developed as sensilla. Unguis with 1 small inner tooth at 1/2 distance of its inner edge from base, and one lateral tooth 1/4 from base. Basal unguicular lamella broad, with tip of apical filament reaching 1/2 distance of inner edge of unguis. Tibiotarsi I-III each with 1 acuminate tenent hair

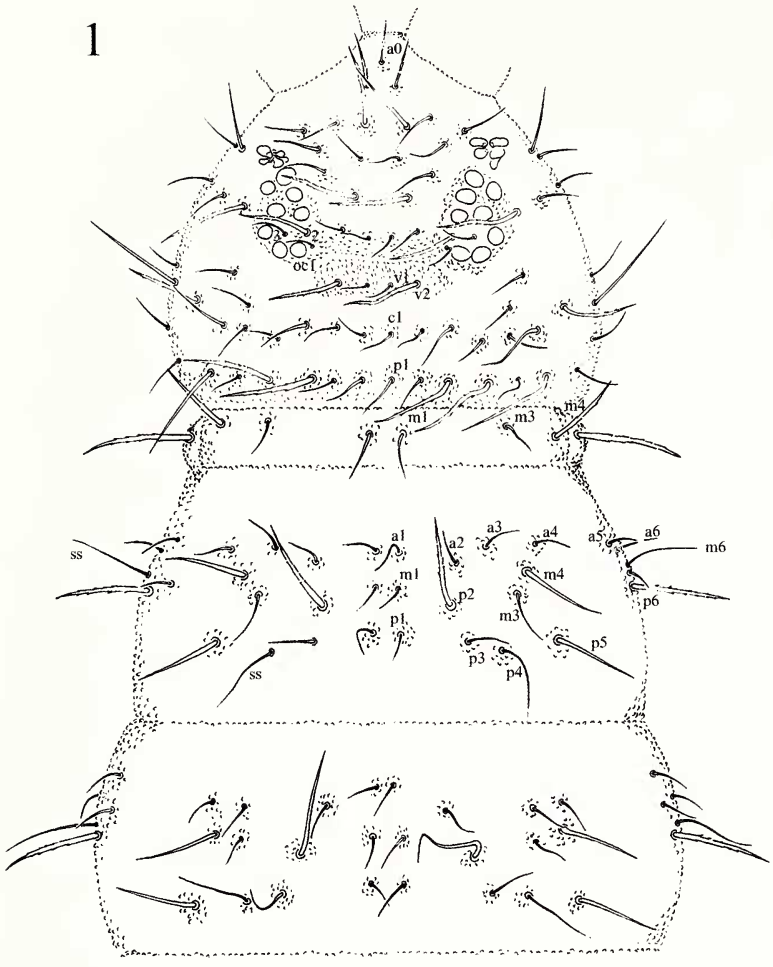
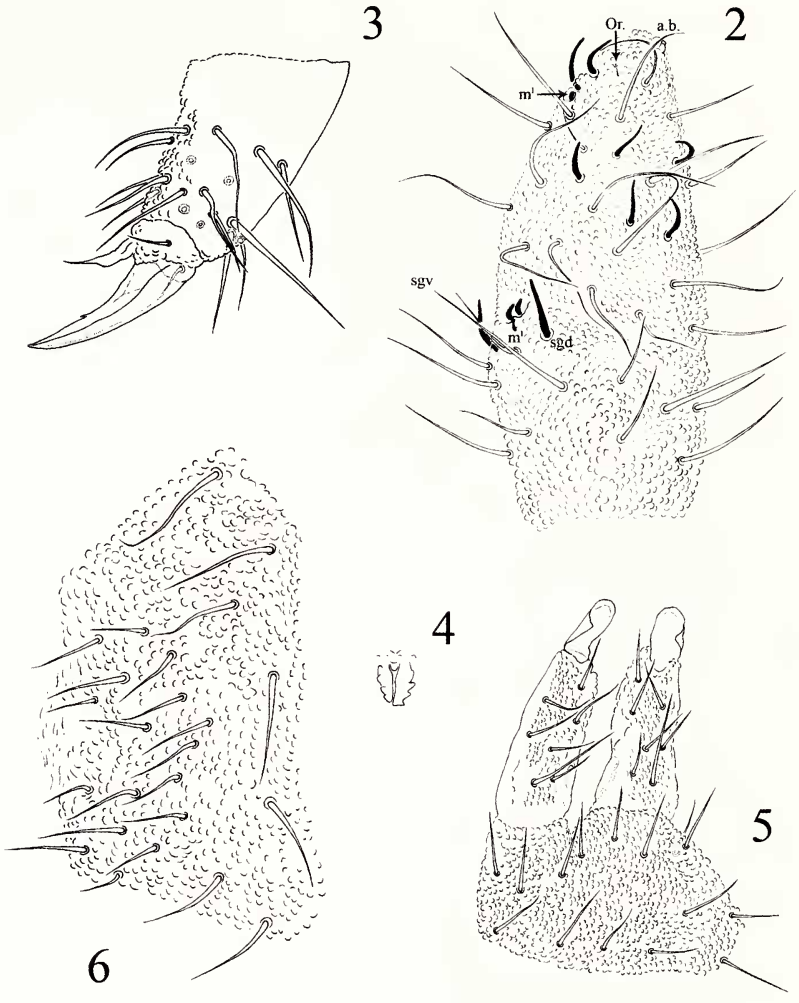


FIG. 1
Cetatophysella tupamara sp. nov., ♀ holotype. Dorsal chaetotaxy of head and thorax.

(Fig. 3). Leg III with 3 setae on subcoxa 1, 3 setae on subcoxa 2, 7 setae on coxa, 7 setae on trochanter, 12 setae on femur, 18 setae on tibiotarsus including the acuminate tenent hair (Fig. 3).

Abdominal dorsal chaetotaxy (see Fig. 7) of type "A", after Thibaud *et al.* (2004). Abd. I-III with 2 rows of setae, 8+8 setae in ar, and also in pr, p_5 developed as sensilla. Abd. IV with 3 rows of setae, p_5 developed as sensilla, ratio between length of p_5 (s) and length of p6 = 2.0: 1. Abd. V with 2 rows of setae, 5+5 setae in ar and rp, p_3 developed as sensilla. Abd. VI with 2 rows of setae, 3+3 setae in ar; p_1 replaced by two anal spines, p_2 seta barbulate and long (Fig. 7). Ventral tube short, with 4+4 setae.



FIGS 2-6

Cetatophysella tupamara sp. nov., ♀ holotype. (2) Dorsal chaetotaxy of Ant. III and IV. (3) Tibiotarsus III. (4) Tenaculum. (5) Furcula. (6) Genital plate.

Tenaculum with 4 teeth on each ramus, no seta on corpus (Fig. 4). Manubrium with 16 setae; dens with 7 thin setae, one basal seta longer than the others. Mucro slightly spoon-like, with outer lamellae, its apex rounded (Fig. 5); ratio between length of dens and length of mucro = 3.2-3.6: 1. Genital plate of female with 3+3 pregenital setae, 15 circumgenital setae and 2 eugenital (Fig. 6), genital plate of male with 3+3 pregenital setae, 13 circumgenital and 4+4 eugenital. Anal lobes with 19 setae each. Two anal spines on Abd. VI short and curved, longer than their basal papillae (Fig. 7).

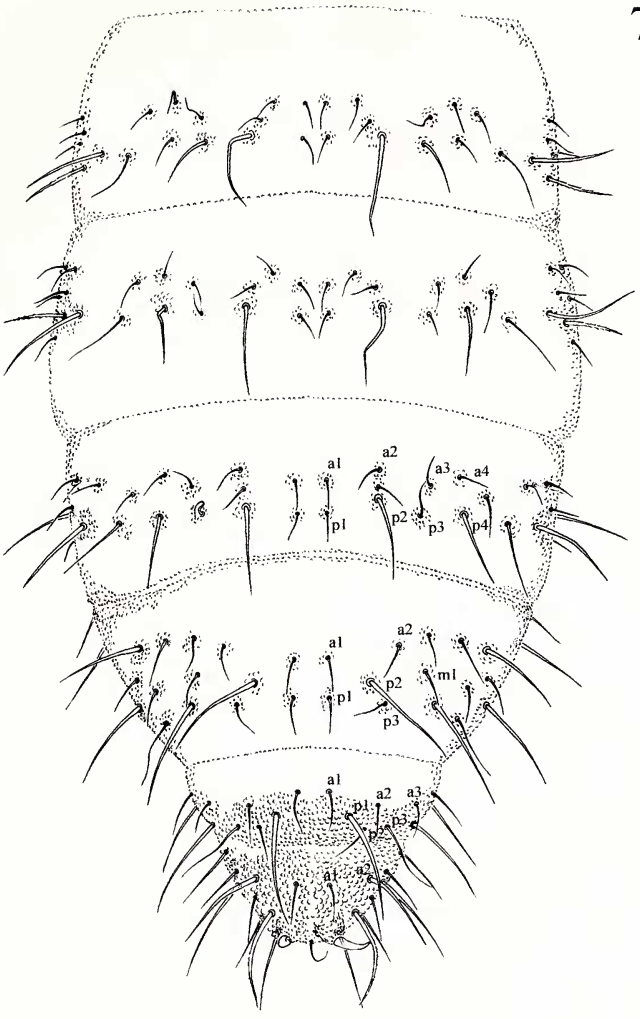


FIG. 7
Cetatophysella tupamara sp. nov., ♀ holotype. Abdominal chaetotaxy in dorsal view.

ETYMOLOGY: The species is named after José Gabriel Condorcanqui Noguera (Tinta, Virreinato del Peru, 19-III-1738 - Cuzco, 18-IV-1781), mainly known as "Túpac Amaru II", leader of the major insurrection in Peru against Spanish colonists in the 18th Century.

TAXONOMIC REMARKS: Although more than 130 species are known in the genus *Ceratophysella*, very few exist in some regions as South America and China. Three species have been cited from South America and seven from China (Jiang *et al.*, 2011; Wu & Yin, 2007; Yue & Fu, 2000), among which *C. baichengensis* and *C. yinae* can be compared with the new species from Peru.

TABLE 1. Comparison between *C. tupamara* sp. nov., *C. denticulata*, *C. baichengensis* and *C. yinae*.

Character	*tupamara*	*denticulata*	*baichengensis*	*yinae*
length in mm	1.5	0.8-1.2	1.1	1.2
apical bulb on Ant. IV	trilobed	simple	bilobed	bilobed
sensilla on Ant. IV	7	7	8	4
seta m4 on Th. I	macroseta	microseta	microseta	macroseta
ocular setae C1 and C3	subequal	different	subequal	subequal
labral papillae	4	6	?	?
lateral tooth on unguis	small	big	big	small
abd. IV setae between macrosetae	2+2	3+3	3+3	3+3
thick setae on dens	0	0	4	0

Table 1 presents a comparison between those two Chinese species, the cospomolitan *C. denticulata* and *C. tupamara* sp. nov. The new species, besides being the biggest of all, has a trilobed apical bulb, which is simple in *C. denticulata* and bilobed in the two Chinese taxa. The ocular seta C1 and C3 are distinctly different only in *C. denticulata*. There are important differences in the chaetotaxy among *C. tupamara* sp. nov. and the other species: most of its macrosetae are barbulate; on Abd. IV there are only 2 + 2 setae between the macrosetae p2, while there are 3 + 3 in the other species. Only in the new species and in *C. yinae* are the setae m4 on Th. I macrosetae. Among these four taxa, *C. baichengensis* has four thick setae on the dens, which are normally developed in the other species.

Besides, *C. tupamara* sp. nov. and *C. denticulata* share the presence of seven sensilla dorsally on Ant. IV, while in *C. baichengensis* there are eight, and only four in *C. yinae*. *Ceratophysella tupamara* sp. nov. and *C. denticulata* have one macroseta P1 on Abd. V widely separate; *C. denticulata* has four setae between their bases, and the new species only two setae. *Ceratophysella baichengensis* has a smaller number of granules between setae p1 on Abd. V (8-10 versus 10-14 in *C. tupamara* sp. nov).

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